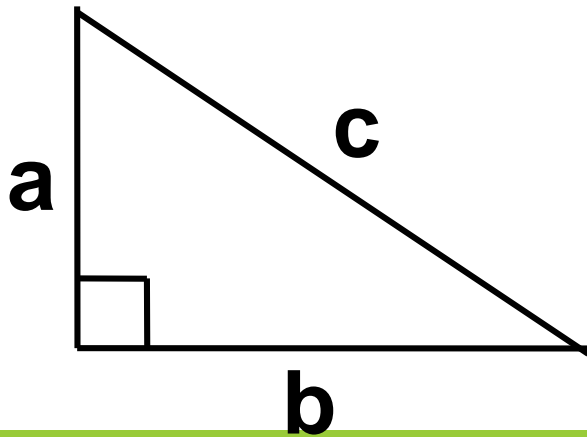


The

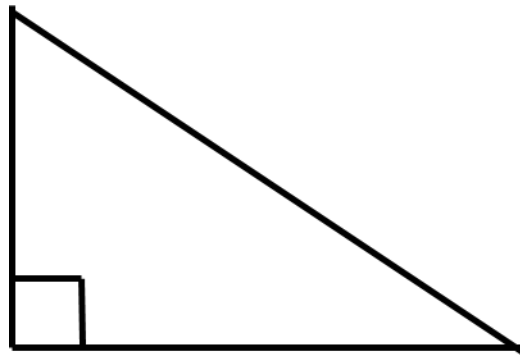
$$a^2 + b^2 = c^2$$

Pythagorean

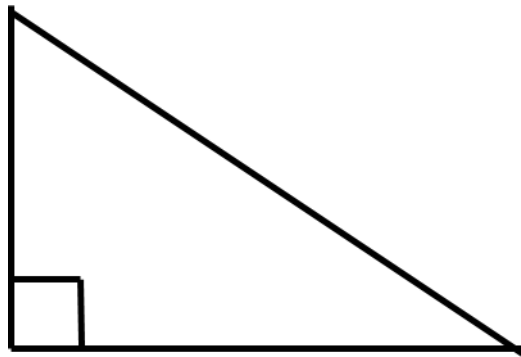
Theorem



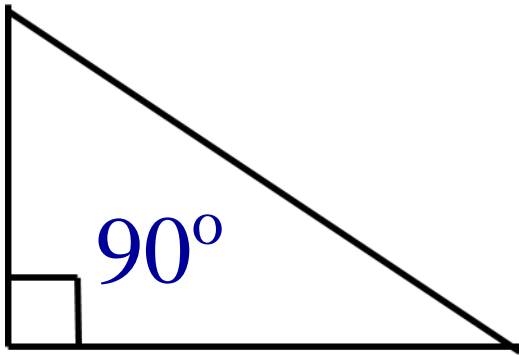
This is a right triangle:



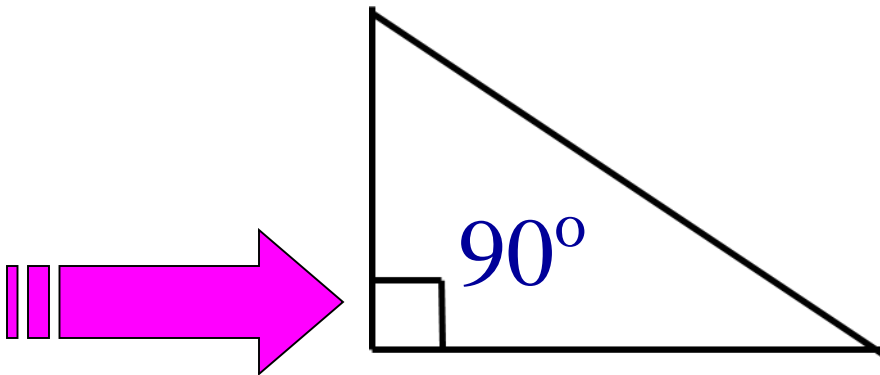
We call it a **right** triangle
because it contains a
right angle.



The measure of a right angle is 90°

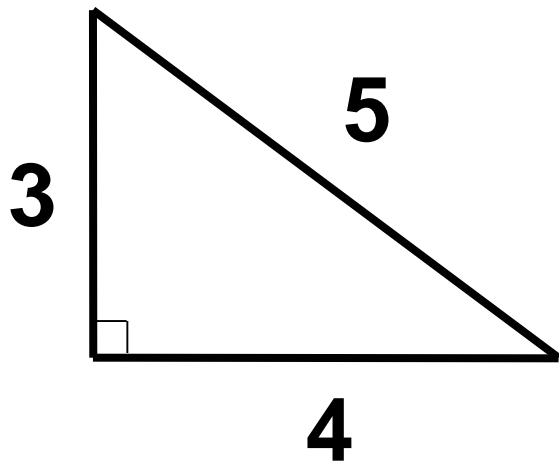


The little square in the angle tells you it is a right angle.

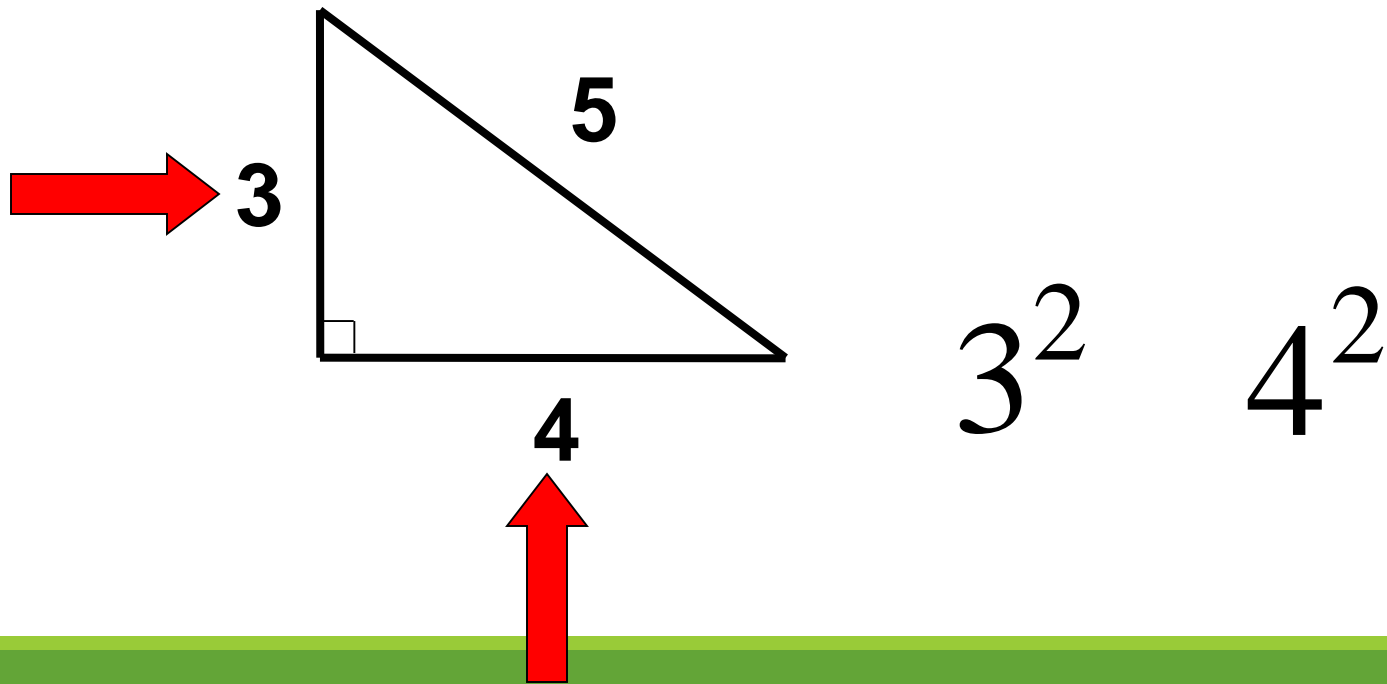


About 2,500 years ago, a Greek mathematician named Pythagorus discovered a special relationship between the sides of right triangles.

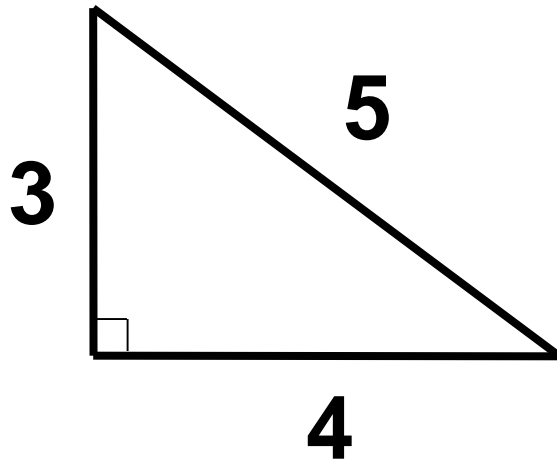
Pythagorus realized that if
you have a right triangle,



and you square the lengths
of the two sides that make
up the right angle,

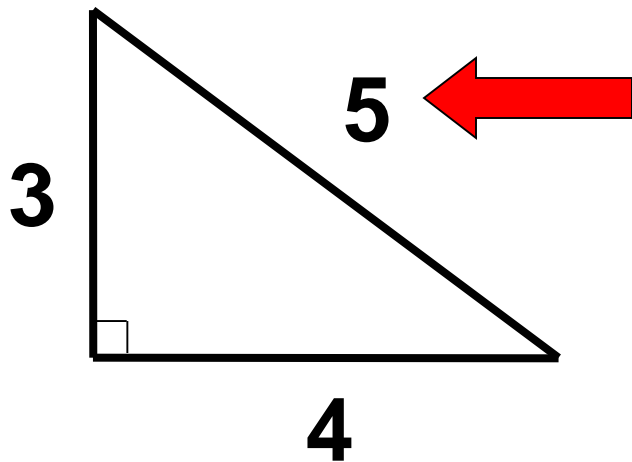


and add them together,



$$3^2 + 4^2$$

you get the same number
you would get by squaring
the other side.



$$3^2 + 4^2 = 5^2$$

Is that correct?

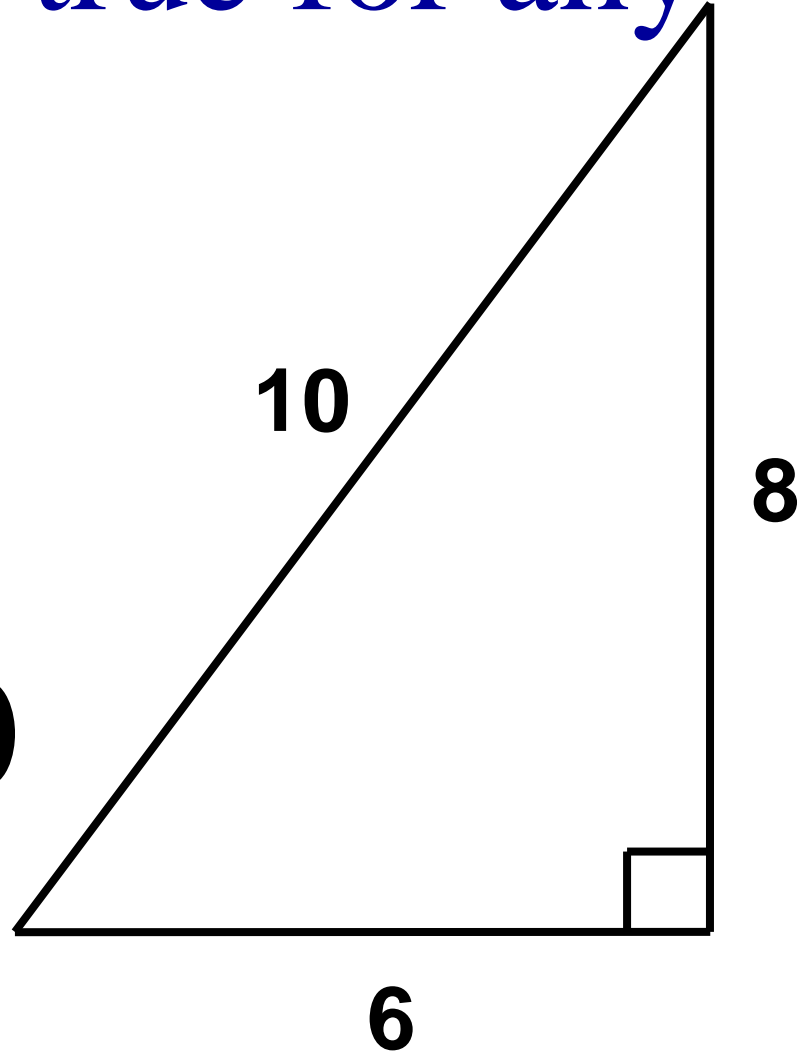
$$3^2 + 4^2 \stackrel{?}{=} 5^2$$

$$9 + 16 \stackrel{?}{=} 25$$

It is. And it is true for any right triangle.

$$6^2 + 8^2 = 10^2$$

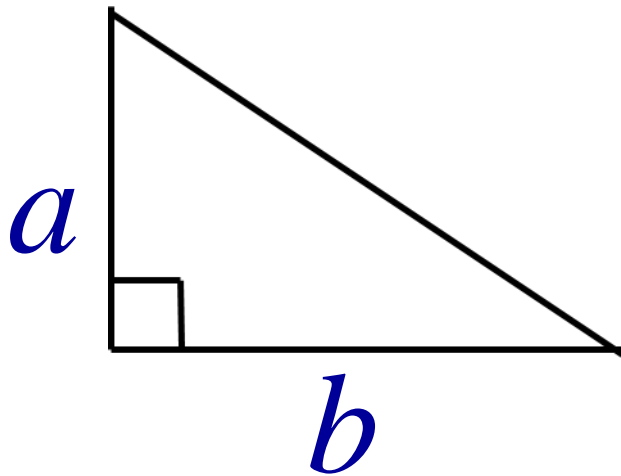
$$36 + 64 = 100$$



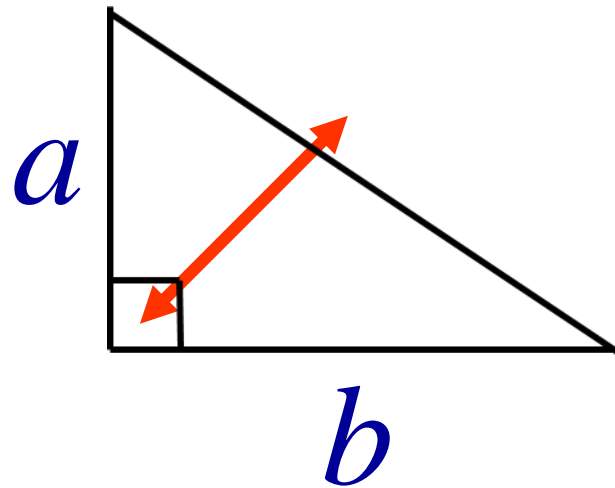
The two sides which
come together in a right
angle are called

The two sides which
come together in a right
angle are called **legs**.

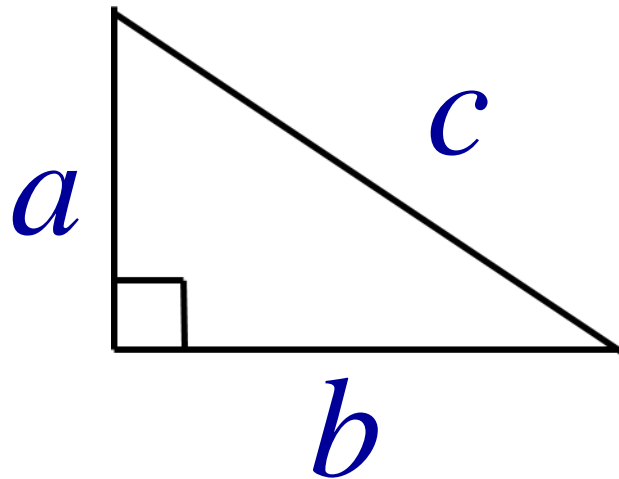
The lengths of the legs are usually called a and b .



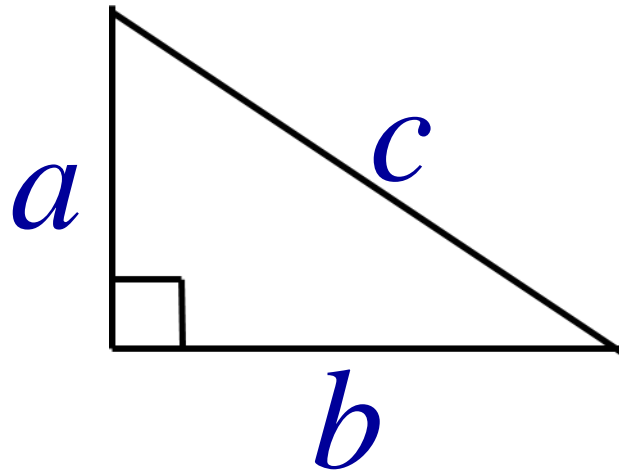
The side across from the
right angle is called the
hypotenuse. □



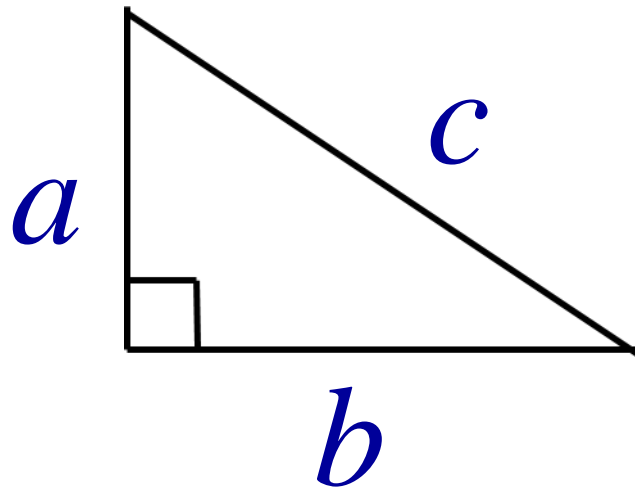
And the length of the
hypotenuse
is usually labeled c .



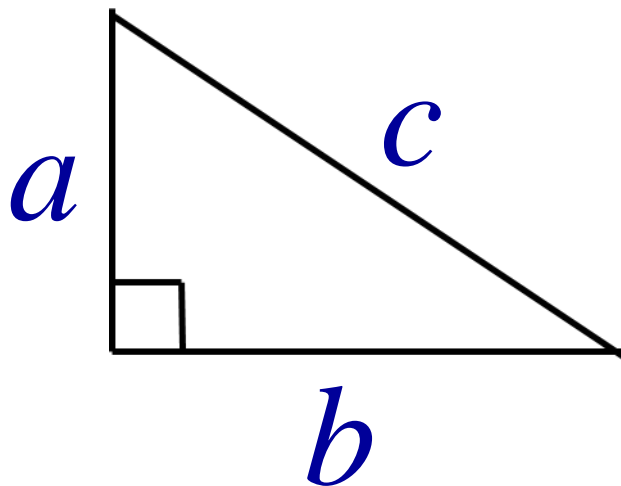
The relationship Pythagorus
discovered is now called
The Pythagorean Theorem.



The Pythagorean Theorem
says, given the right triangle
with legs a and b and
hypotenuse c ,



then $a^2 + b^2 = c^2$.



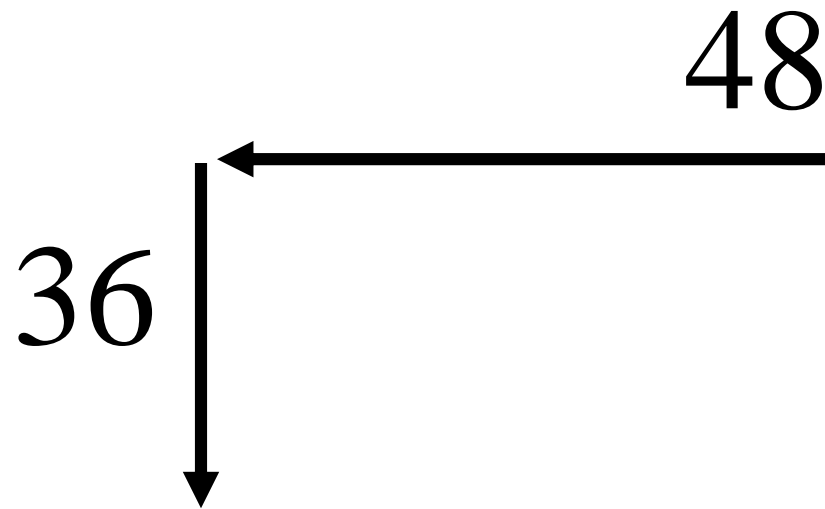
You can use The Pythagorean Theorem to solve many kinds of problems.

48

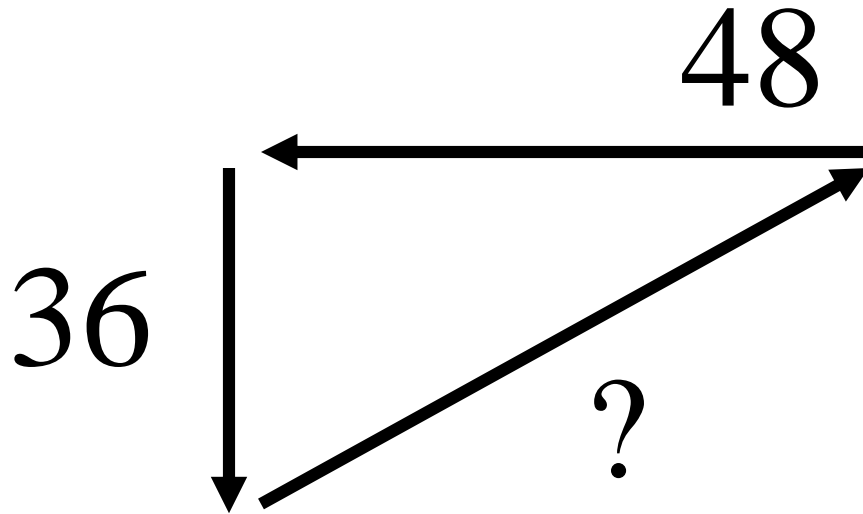


Suppose you drive directly west for 48 miles,

Then you turn south and
drive for 36 miles.

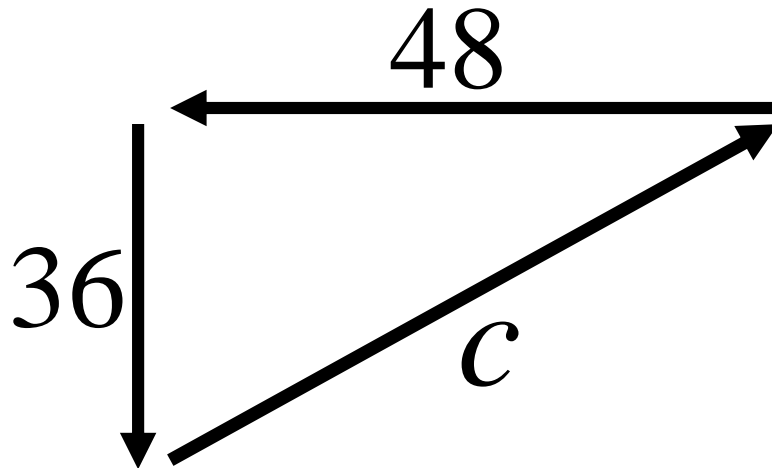


How far are you from where
you started?



Using The Pythagorean Theorem,

$$48^2 + 36^2 = c^2$$



Why?

Can you see that we have a right triangle?

$$48^2 + 36^2 = c^2$$

36

48

c

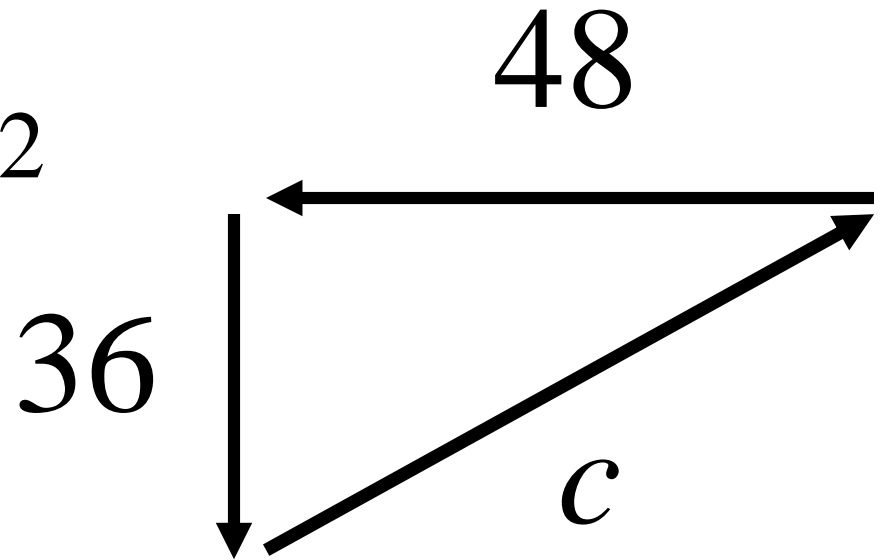
..

7

Which sides are the legs?

Which side is the hypotenuse?

$$48^2 + 36^2 = c^2$$



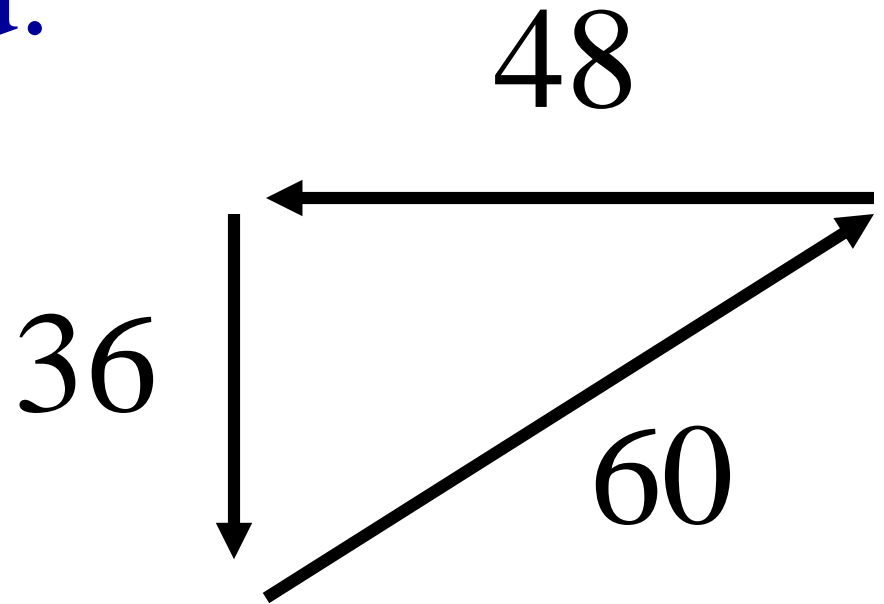
Then all we need to do is
calculate:

$$48^2 + 36^2 = 2304 + 1296 =$$

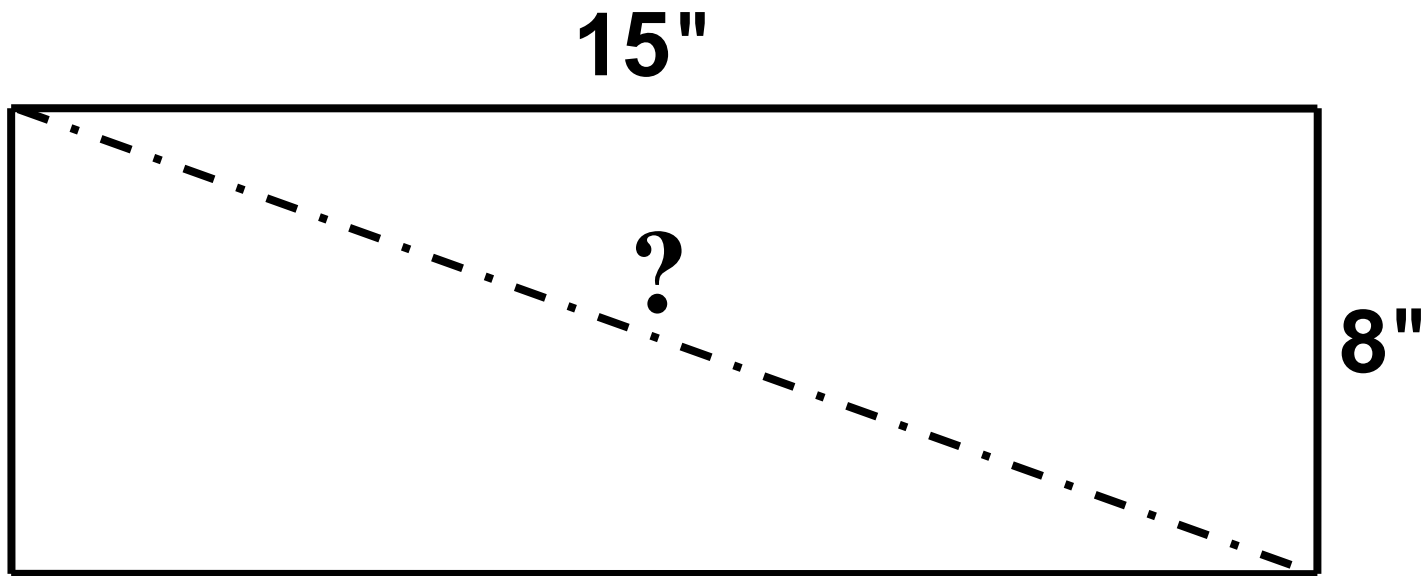
$$3600 = c^2$$

So, since c^2 is 3600, c is 60.

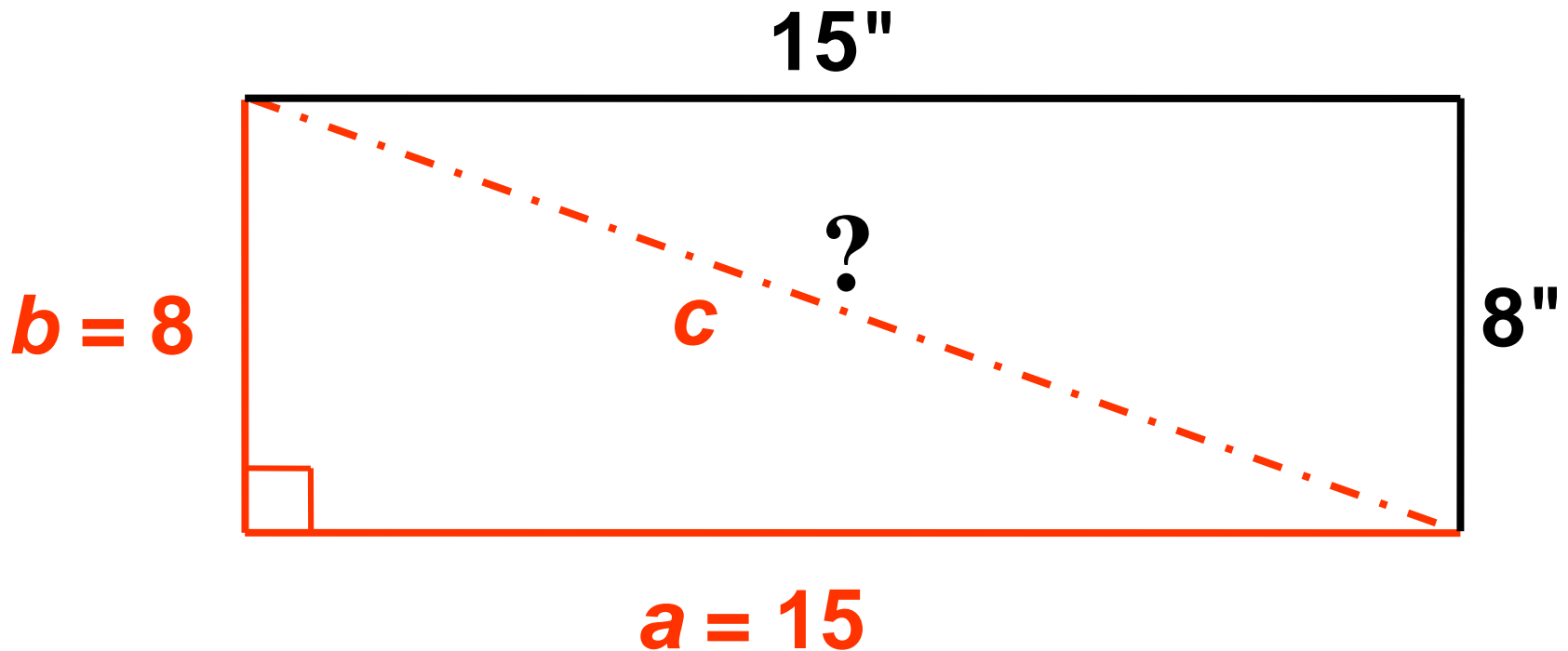
And you end up 60 miles from where you started.



Find the length of a
diagonal of the rectangle:



Find the length of a diagonal
of the rectangle:



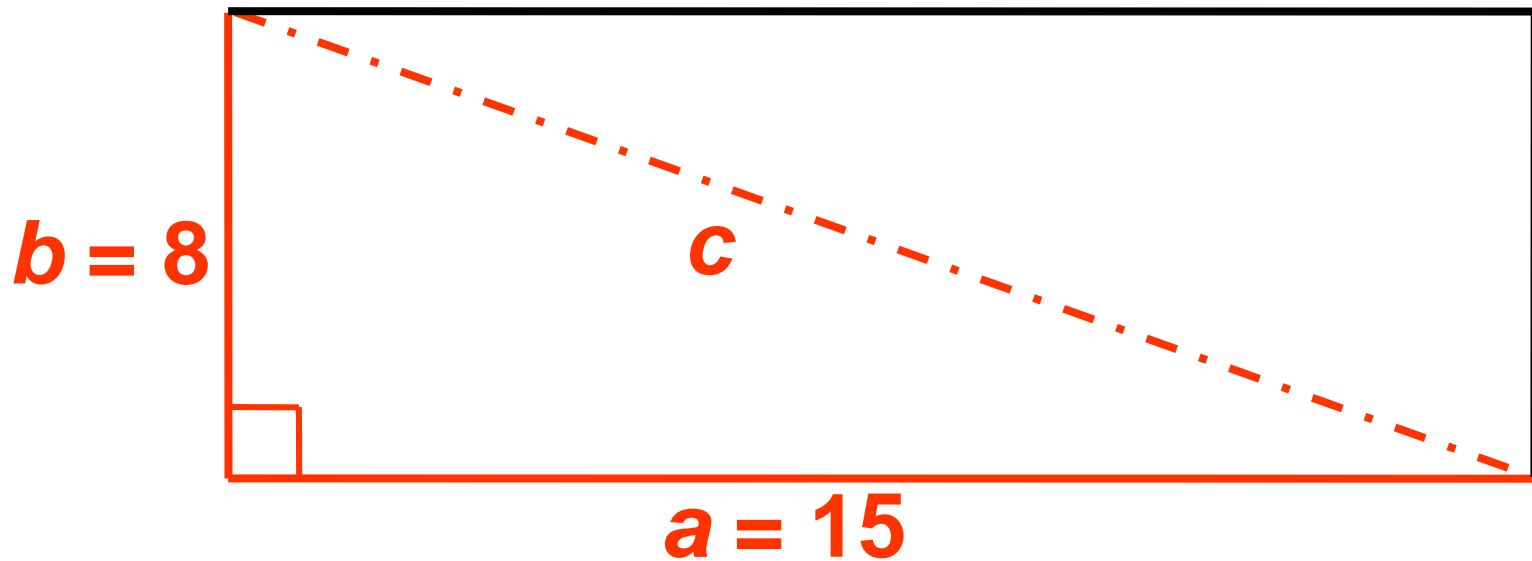
$$a^2 + b^2 = c^2$$

$$15^2 + 8^2 = c^2$$

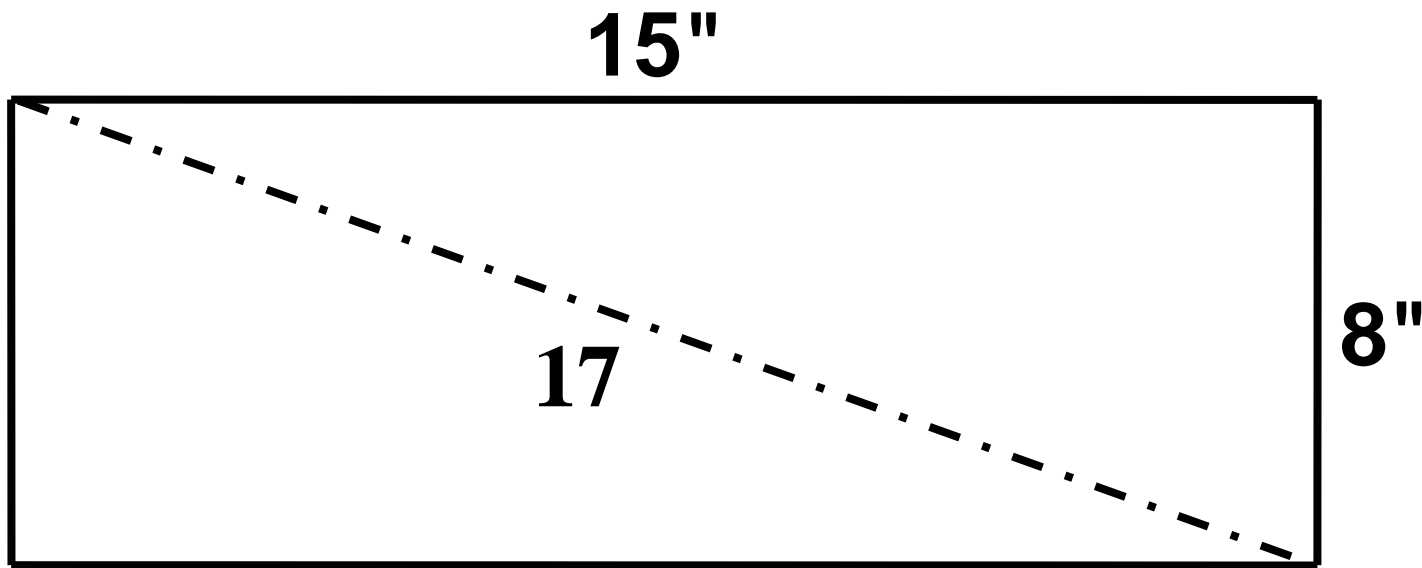
$$225 + 64 = c^2$$

$$c^2 = 289$$

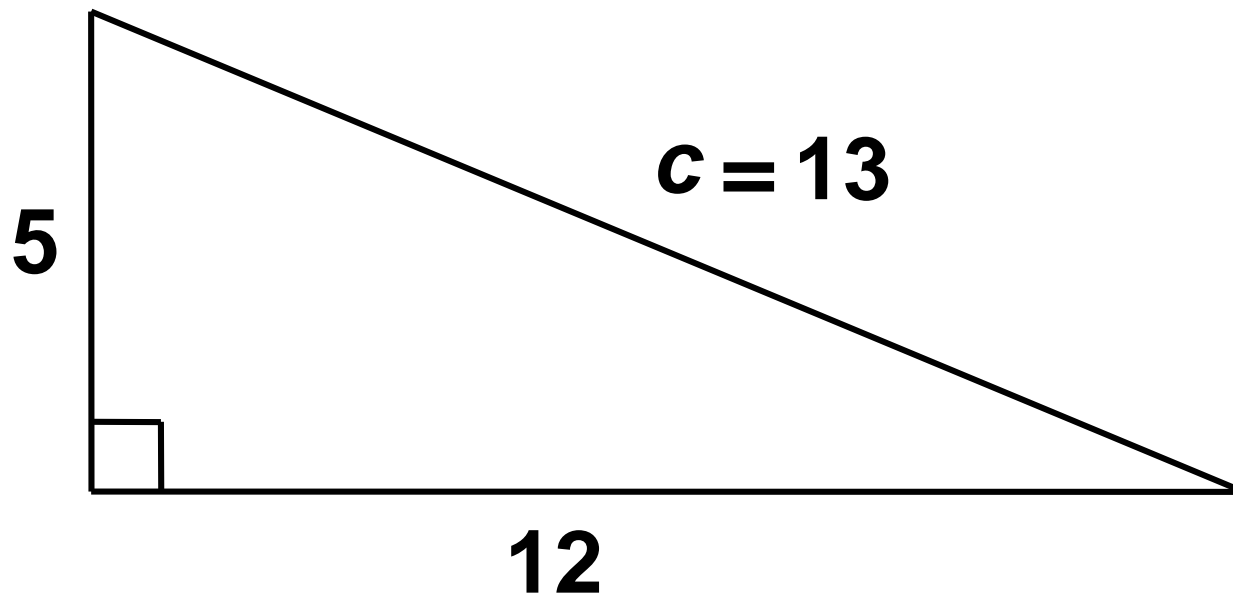
$$c = 17$$

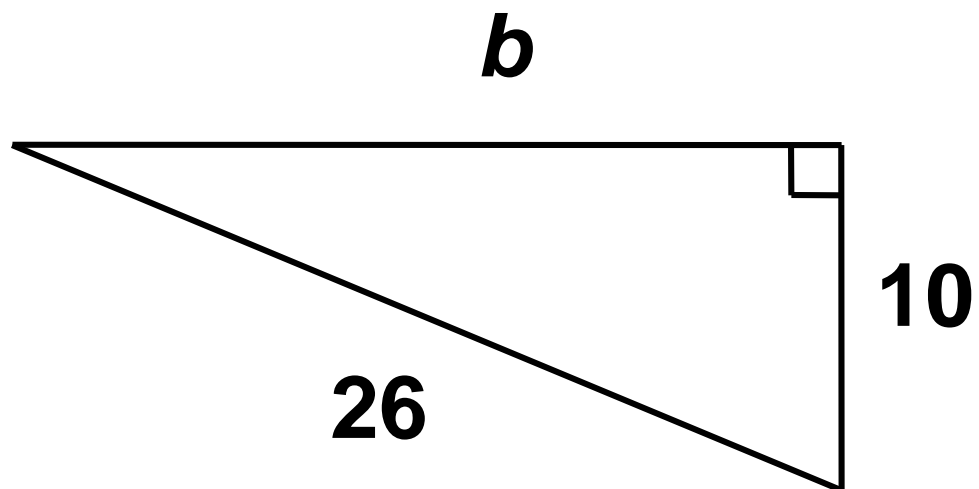


Find the length of a
diagonal of the rectangle:

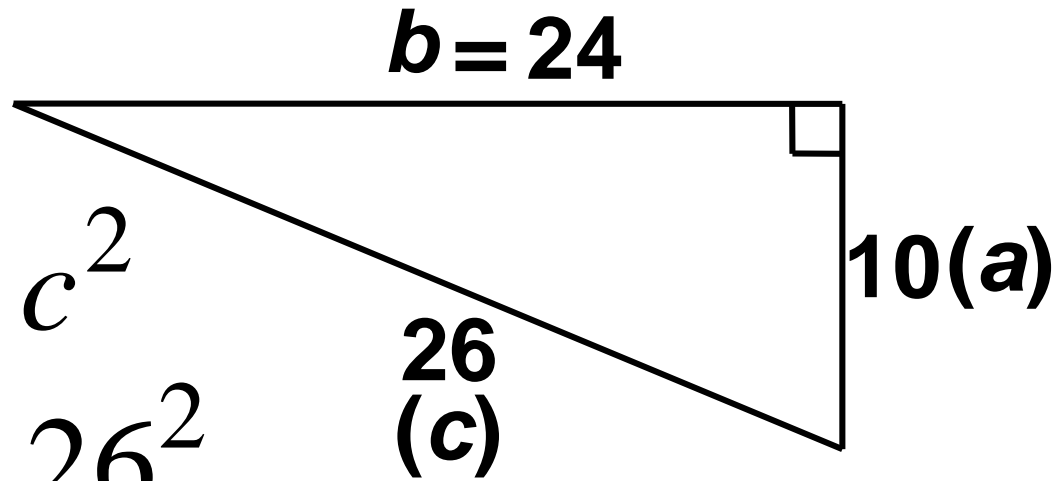


Practice using
The Pythagorean Theorem
to solve these right triangles:





$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 10^2 + b^2 &= 26^2 \\
 100 + b^2 &= 676 \\
 b^2 &= 676 - 100 \\
 b^2 &= 576
 \end{aligned}$$



$$b = 24$$

